

**ABSTRACT OF THE DISCLOSURE**

The present technique provides a variety of processing schemes for decomposing soft tissue and bone images more accurately from low and high-energy images acquired from an imaging system, such as a dual-energy digital radiography system using flat-panel technology. In particular, a parameter selection process is provided for automatically computing the decomposition parameters WS and WB to create soft tissue and bone images, respectively. The parameter selection process modifies a default decomposition parameter based on a variety of image and technique variables, such as intensity levels of the low and high-energy images, the patient size, and the collimator filtration setting. The parameter selection process avoids robustness problems associated with image-based algorithms, and the process may operate without any direct user interaction.

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